



# OSWER Innovations Pilot

## ***Groundwater Remediation Powered by Renewable Energy Sources***

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*The Office of Solid Waste and Emergency Response (OSWER) initiated a series of innovative pilots to test new ideas and strategies for environmental and public health protection to make OSWER programs more efficient, effective, and user-friendly. A small amount of money is set aside to fund creative proposals. The creative projects test approaches to waste minimization, energy recovery, recycling, land revitalization, and homeland security that may be replicated across various sectors, industries, communities, and regions. We hope these pilots will pave the way for programmatic and policy recommendations by demonstrating the environmental and economic benefits of creative, innovative approaches to the difficult environmental challenges we face today.*

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### **BACKGROUND**

Energy conservation is recognized as beneficial both in terms of preserving fossil fuel resources and in reducing harmful emissions during fossil fuel combustion. Major initiatives have been successful in reducing energy consumption by automobiles, electric appliances, heating and cooling systems, and industrial processes. However, there are few, if any, instances of directly applying renewable energy to groundwater remediation systems. A proven, innovative groundwater remediation system known as groundwater circulation wells (GCW) is an excellent candidate for the use of renewable energy because GCWs are stand-alone systems with relatively small power requirements. Commercially available wind turbine generators may be the perfect solution for powering GCW systems. GCWs conserve the groundwater resource by extracting contaminated groundwater at one depth, treating the groundwater, and recharging the groundwater through another portion of the same well. Therefore, using a wind turbine will help preserve our clean air resource while restoring our groundwater resource.

### **PILOT APPROACH**

U.S. EPA Region 7, in partnership with the University of Missouri-Rolla, the U.S. Army Corps of Engineers Kansas City District, and Bergey Wind Systems, Inc., will demonstrate the use of a renewable energy source to provide the power needed for a groundwater remediation system. The University of Missouri-Rolla

will design and construct a wind system, with consultation from Bergey, at an operational GCW system located on the Former Nebraska Ordnance Plant Superfund site in Mead, Nebraska. The U.S. Army Corps of Engineers will operate the groundwater system. GCW influent and effluent streams will be sampled for volatile organic compounds monthly to provide data to be used in combination with GCW flow data to characterize the amount of contamination removed from the aquifer.

### **INNOVATION**

The pilot couples the concept of the conservation of fossil fuel energy with the remediation of critical groundwater resources. Unlike domestic or industrial processes, which require dependable energy sources, the design and operation of focused remediation systems may be tailored to a variable power supply system. Therefore, several renewable power schemes may be appropriate for groundwater remediation, including complete replacement of grid-supplied power. In addition, wind powered GCW systems in remote areas will not need utility easements associated with connecting remote systems to the power grid and may be enhanced with backup battery storage capacity if desired.

### **BENEFITS**

Preliminary calculations indicate that the estimated energy costs saved in the operation of an existing GCW system at the former Nebraska Ordnance Plant site would pay for the capital costs of constructing a wind turbine system within 10 to 13 years. If utility costs increase, the wind turbine costs could be recovered within 8 to 9 years. The use of a wind turbine system means that risk from exposure to contaminated groundwater is reduced without increasing the risk generated from the combustion emissions associated with fossil fuel energy. Additionally, fossil fuel resources are conserved.

## **CONTACTS**

Dave Drake, EPA Region 7, 913-551-7626

For additional information, visit the EPA OSWER Innovations web site at: [www.epa.gov/oswer/IWG.htm](http://www.epa.gov/oswer/IWG.htm).